JC944 U.S. PTO 10/19/00

10-23-00

A

Please type a plus sign (+) inside this box → [+]

PTO/SB/05 (4/98)
Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

JC841 U.S. PTO 09/693518 10/19/00

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R § 1 53(b))

Attorney Docket No.	EFIM0227
First Inventor or Application Identifier	Motamed et al.
Title	Automatic Print Load Balancing
Express Mail Label No.	EL540886879US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. [X] * Fee Transmittal Form *(e.g., PTO/SB/17)* *(Submit an original and a duplicate for fee processing)*
2. [X] Specification [Total Pages 17] *(preferred arrangement set forth below)*
   - Descriptive title of the Invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. [X] Drawing(s) *(35 U.S C. 113)* [Total Sheets 6]
4. Oath or Declaration [Total Pages 3]
   - a [ ] Newly executed (original or copy)
   - b. [ ] Copy from a prior application (37 C.F R § 1 63(d)) *(for continuation/divisional with Box 16 completed)*
     - i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C F.R §§ 1 63(d)(2) and 1 33(b)

NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27). EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C F R. § 1.28).

5. [ ] Microfiche Computer Program *(Appendix)*
6. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   - a. [ ] Computer Readable Copy
   - b. [ ] Paper Copy (identical to computer copy)
   - c [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. [ ] Assignment Papers (cover sheet & document(s))
8. [ ] 37 C.F.R §3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
9. [ ] English Translation Document *(if applicable)*
10. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
11. [ ] Preliminary Amendment
12. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
13. [ ] * Small Entity Statement(s) *(PTO/SB/09-12)* [ ] Statement filed in prior application, Status still proper and desired
14. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
15. [ ] Other: .....

16. **If a CONTINUING APPLICATION,** *check appropriate box, and supply the requisite information below and in a preliminary amendment*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No. _____/_____

Prior application information. *Examiner* _____ *Group / Art Unit* _____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17. CORRESPONDENCE ADDRESS

[X] *Customer Number or Bar Code Label* 22862 *(Insert Customer No or Attach bar code label here)* or [ ] *Correspondence address below*

Name					
Address					
City		State		Zip Code	
Country		Telephone		Fax	

Name (Print/Type)	Michael A. Glenn	Registration No. (Attorney/Agent)	30,176
Signature		Date	10/19/00

Burden Hour Statement: This form is estimated to take 0 2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

JC944 U.S. PTO
10/19/00

PTO/SB/17 (6/99)
Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

JC841 U.S. PTO
09/693518
10/19/00

FEE TRANSMITTAL for FY 1999

Patent fees are subject to annual revision
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid See Forms PTO/SB/09-12. See 37 C.F.R §§ 1.27 and 1.28

TOTAL AMOUNT OF PAYMENT ($) 822.00

Complete if Known	
Application Number	Unassigned
Filing Date	Herewith
First Named Inventor	Motamed et al.
Examiner Name	Unassigned
Group / Art Unit	Unassigned
Attorney Docket No.	EFIM0227

METHOD OF PAYMENT (check one)

1. [X] The Commissioner is hereby authorized to charge indicated fees and credit any over payments to.

Deposit Account Number: 05-0770

Deposit Account Name: Electronics for Imaging

[X] Charge Any Additional Fee Required Under 37 CFR §§ 1.16 and 1.17

2. [ ] **Payment Enclosed:**
[ ] Check [ ] Money Order [ ] Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	760	201	380	Utility filing fee	710.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	760	208	380	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 710.00

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below	Fee Paid
Total Claims	24	-20** =	4	X	18.00	= 72.00
Independent Claims	2	- 3** =	0	X	80.00	= 0.00
Multiple Dependent						=

**or number previously paid, if greater, For Reissues, see below

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim, if not paid
109	78	209	39	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 72.00

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40.00
146	760	246	380	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	760	249	380	For each additional invention to be examined (37 CFR § 1.129(b))	
Other fee (specify)					
Other fee (specify)					

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 40.00

SUBMITTED BY				Complete (if applicable)	
Name (Print/Type)	Michael A. Glenn	Registration No (Attorney/Agent)	30,176	Telephone	650-474-8400
Signature				Date	10/19/00

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

AUTOMATIC PRINT LOAD BALANCING

This application claims priority from Provisional Patent Application No. 60/160,414 filed October 19, 1999.

BACKGROUND OF THE INVENTION

TECHNICAL FIELD

The invention relates to printing. More particularly, the invention relates to an apparatus and to a family of methods which reduces print times by using cluster printing, print load balancing and color and black-and-white page splitting.

DESCRIPTION OF THE PRIOR ART

Prior art attempts to reduce the time it takes to complete a print job have focused mainly on improving hardware performance. No prior art has attempted to reduce print times by dividing a print job across all available resources.

Typically, a large company will occupy a large office space with a multitude of computers and printers, all networked together. The multitude of printers is acquired to handle peak periods of printing so that there will not be a slow

down. However, outside of peak periods there are many idle times in which many a printer will not be in use.

This makes for a highly inefficient scheme because, although there are available printers, a user cannot take advantage of all of them. A user typically selects a single printer and performs the entire print job on that printer. What is needed is a method and/or apparatus that would allow the use of many or all available printers to simultaneously perform a print job. In that way the total time to complete a single print job can be reduced.

SUMMARY OF THE INVENTION

The apparatuses and methods described herein implement a novel and unique facility that decrease the time taken to perform a print job. This is accomplished by print load balancing, cluster printing and color, black-and-white page splitting.

The print load balancing consists of several aspects. One aspect is to route print jobs to the most available printer based on factors such as color, black-and-white printing, printing page per minute rates, the number of pages in a job, size and number of copies in a job. Another aspect is to split the printing over more than one printer where there are several copies to be made. Yet another aspect is to split the printing of page over more than one printer for a single document.

Cluster printing consists of specifying a group of printers from which a print job can be performed.

Color/black-and-white page splitting consists of splitting a printer job by sending non-color pages to black-and-white printers and sending pages with color, to color printers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an overall system view of a multi-user local area network system that includes several printers;

FIG. 2 is graphical interface window that shows the current list of selected printers;

FIG. 3 is a graphical interface window that allows the user to modify the current list of selected printers;

FIG. 4 is a graphical interface showing the available print groups;

FIG.5 is a graphical interface that allows a user to modify the name of a print group; and

FIG. 6 is a graphical interface that lists the printers assigned to a particular print group.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The apparatuses and methods described herein implement a novel and unique facility that decrease the time taken to perform a print job. This is accomplished by print load balancing, cluster printing and color, black-and-white page splitting.

FIG. 1 shows an exemplary interface between multiple host computers 12 and 14 and multiple printers, generally designated by the index numerals 13, 16a, 16b, 16c, and 16d. Printer 13 includes an internal network adapter 11, located within the printer housing and the other printers also preferably include such a network adapter. Network adapter 11 is connected to host computers 12 and 14 through a network, such as the local area network (LAN) 15.

Additionally, two or more LAN's 15, 115 (including additional printers 116a, 116b) may be interconnected over a WAN 120, such as the Internet, via one or more gateways 125. In such configuration, a segmented network is provided. The gateway conserves WAN bandwidth by routing only those print jobs to the WAN that need to access a remote printer.

The host computers 12 and 14 can be installed in close proximity to one or more of the printers of FIG. 1, however, when operated according to the

principles of the present invention, such host computers can be located quite remote from these printers, as discussed above. The overall system, generally designated by the index numeral 10, can be spread in practical use on a single floor, across an entire building, or across several buildings. Each of the printers 13, 16a, 16b, 16c, and 16d, may be of the same type or of different models. Such preferred printers can be either black-and-white or color printers.

A load balancing module 130 implements various inventive features discussed herein, and may be located in a single location, or may be distributed. In either event, the load balancing module may be located in a printer, a client, or a gateway.

Cluster Printing

Cluster printing consists of specifying a group of printers from which a print job can be performed.

A first step in this process is to identify all available printers from which a user may select printer clusters or groups from. For purposes of clarification the term printer and fiery may be used interchangeably.

FIG. 2 is the Edit My Printer List window 20 that shows the current list of selected printers 22 available. A user may modify this list by selecting the

Modify button 24. Selecting the Modify button opens a sub-window 30 as shown in FIG. 3.

One method to find available printers is by selecting the AutoSearch tab 32 , which starts a search across the local network for connected printers. Selection of the Refresh button 34 causes the local network to be searched again. The user can also search for printers by selecting IP addresses that fall within a user specified range (not shown). Once a printer is found its name 36 , device name 38 and IP address 31 are displayed in the available window 37. Another method is to search for the printers manually. Selecting the Manual tab 33 allows a user to search for a printer by domain name or by entering a specific IP address (not shown).

To make an available printer part of the printer pool 35 from which groups may be selected, a user highlights the printer in the available window 37, then presses the center button 39. The highlighted printer then moves to the printer pool 35. A user removes a printer from the printer pool list by highlighting the printer and pressing the Remove button 40. The printer is then returned to the available printer list 37.

Selection of the Modify 24 button also allows the user to change a printer's name (not shown)

Once the printer pool is created, a user may then create print groups. Print groups are groups of printers that can be designated as the group to be load balanced to. A print group can be of any choice the user desires, but is

typically created based on the spatial relationship to the user. For example, a user working on the first floor of his office building would likely create a print group containing all the printers on the first floor. This would allow easy access to all the printers performing the group print job.

FIG. 4 is the Print Groups window 42 showing available print groups 44. A user is able to add or remove a group by selecting the Add 46 or Remove 48 buttons respectively. Highlighting a group 41 and selection of the Edit Group button 43 opens a sub-menu as shown in FIG. 5. From this menu a user can change the group name by entering it into the Edit Group Name box 52. A user can also select to Direct, Hold or Print in the Print To Queue box 54.

Referring again to FIG. 4, selecting the View Group button 45 opens up the Group List window 60 shown in FIG. 6. This window lists the printers 62 assigned to that group. Selecting the Edit Group Name button 64 opens the Edit Group 50 window as previously described. Selecting the Edit Fiery Properties button 66 opens the Edit My Fiery List window 30 as previously described.

Errors often occur with printers. Thus, within a cluster of printers a user may set for automatic rerouting of a print job to another printer if the first selected printer is unable to perform a print job. A user may also specify a timeout period before the job is rerouted. In that way the user is given time to fix the problem. This is helpful when the printer problem can be easily fixed, for example where there is a paper jam or the printer is out of paper.

Print Load Balancing

Print load balancing consists of several aspects. One aspect is to route print jobs to a printer based on such factors as printing page per minute rates and the number of pages in a job. Another is aspect is to split the printing over more than one printer where there are several copies or sets to be printed. Yet another aspect is to split the printing over more than one printer when a single job has a high number of pages to print.

Printing page per minute rates

The print load balancing can be set so that the printer with the fastest printing will be chosen first. If the fastest printer is unavailable or in use, then the next fastest printer will be chosen. This hierarchal process is continued until either no printers are left or the available printers' print speed drops below a user specified threshold.

Number of Pages in a Job

Often it is desirable to split a single print job where the print job has high number of pages, for example 200. The user can specify the minimum number of pages a single job must be before the job is split up. Also, the user can specify the maximum number of printers the job will go to within a group. For example, a 200 page document is printed on five printers. Each printer prints forty pages with one printer printing pages 1-40, a second printer

printing pages 41-80, a third pages 81-120, a fourth pages 121-160 and the fifth printer printing pages 161-200.

Number of Copies

Where a print job has multiple copies, settings are made so that the copies or sets will print over many printers. For example, where ten copies are desired and ten printers are available, each printer will print a single copy. A user sets the maximum number of printers used. If a user sets the maximum number of printers to five printers, and wishes to print ten copies, each printer will print two copies.

Color/Black-and-White Page Splitting

Color/black-and-white page splitting consists of splitting a printer job by sending non-color pages to black-and-white printers and sending pages with color, to color printers.

Choosing how the print job will be split depends on several factors. One factor is the availability of printers. Typically there are both color printers and black-and-white printers within a printer group. Where the entire print job lacks pages with color, the print job will be sent to black-and-white printers only.

Likewise, where a print job has color elements on every page, the entire print job will be sent to color printers only. However, the invention may readily be used to print all pages of a job in color or in black and white; to split the job so

that color pages are routed to a color printer and black and white pages are routed to a black and white printer, or to apply an auto-detect scheme.

Where the print job has color and non-color pages, the non-color pages will be printed on black-and-white printers, while the pages with color are printed on color printers. The pages are then merged afterwards.

Several merge methods are available to collate print jobs that are split across multiple printers. One merge method is a manual method where a human person is relied upon to combine the non-color and color pages. Another method is the use of a coversheet and an external collator. The coversheet contains a machine and human readable barcode and is produced along with each print job. The coversheet contains instruction on how to merge the document. The coversheet and printed pages are inserted into an external collator and the document is merged into its final format. The invention can use in-line collator. In such application, information on the cover sheet is machine readable. The invention can also use a human readable cover sheet. The cover sheet can be used to determine collation.

Other merge methods include letting each printer perform the collation.

Other Embodiments

Priority Printing

Several options are available to set the priority of a print job. Normally, print jobs are performed in the order they are queued. However, a user may set her print job on fastest or background. A fastest setting will move the print job to the front of the queue so that it will be printed first. If a print job is already being performed, a print job with a fastest setting will start printing afterward. All other queued print jobs will be printed in the order they were queued.

A print job with a background setting will wait until all other queued print jobs are printed first. For example, if a print job with a background setting is queued, it will be the last print job to be printed. If another print job is queued afterwards then that later queued print job will move ahead of the print job with the background setting. This will continue until there are no other queued print jobs. If there are two or more background print jobs, each background print job will be printed in the order in which they were queued, unless a non-background print job is queued. If that happens the non-background print job will be printed before both print jobs with the background setting.

Job Scheduling

The user can also schedule print jobs long into the future. The user inputs the time and date she wishes the print job to be performed. When the inputted date and time arrives, the print job is performed, *e.g.* through the printer driver.

Accordingly, although the invention has been described in detail with reference to a particular preferred embodiment, persons possessing ordinary

skill in the art to which this invention pertains will appreciate that various modifications and enhancements may be made without departing from the spirit and scope of the claims that follow.

CLAIMS

1. A method for performing a single print job between a plurality of printers connected to a computer through a communication means, comprising:

determining with said computer through which of said plurality of printers said print job is to be transmitted so as to balance said print job between said plurality of printers based upon a load balancing scheme;

transmitting through said communication means, said print job to said plurality of printers based on said load balancing scheme;

printing said print job by said plurality of printers.

2. The method of claim 1 wherein said load balancing scheme divides said print job by sets.

3. The method of claim 1 wherein said load balancing scheme divides said print job by sending pages with no color to black-and-white printers and sends pages with color to color capable printers.

4. The method of claim 1 wherein said load balancing scheme divides said print job by page number.

5. The method of claim 1 wherein said plurality of printers is user defined.

6. The method of claim 1 wherein a printer from said plurality of printers is removed upon an error.

7. The method of claim 1 wherein said print job has a user defined priority.

8. The method of claim 7 wherein said priority puts said print job first amongst all queued print jobs.

9. The method of claim 7 wherein said priority delays said print job until all other queued print jobs are performed.

10. The method of claim 7 wherein said priority queues said print job at a specific date and time.

11. The method of Claim 7 wherein said user defined priority is a print speed threshold.

12. The method of Claim 1 wherein a print job is rerouted in the event of printer error based upon factors which may include any of the state of any or all eligible printers, the type of error, user defined, and interactive options.

13. An apparatus for performing a single print job between a plurality of printers connected to a computer through a communication means,

comprising:

a module for determining with said computer through which of said plurality of printers said print job is to be transmitted so as to balance said print job between said plurality of printers based upon a load balancing scheme;

a module for transmitting through said communication means, said print job to said plurality of printers based on said load balancing scheme;

a module for printing said print job by said plurality of printers.

14. The apparatus of claim 13 wherein said load balancing scheme divides said print job by sets.

15. The apparatus of claim 13 wherein said load balancing scheme divides said print job by sending pages with no color to black-and-white printers and sends pages with color to color capable printers.

16. The apparatus of claim 13 wherein said load balancing scheme divides said print job by page number.

17. The apparatus of claim 13 wherein said plurality of printers is user defined.

18. The apparatus of claim 13 wherein a printer from said plurality of printers is removed upon an error.

19. The apparatus of claim 13 wherein said print job has a user defined priority.

20. The apparatus of claim 13 wherein said priority puts said print job first amongst all queued print jobs.

21. The apparatus of claim 13 wherein said priority delays said print job until all other queued print jobs are performed.

22. The apparatus of claim 13 wherein said priority queues said print job at a specific date and time.

23. The apparatus of Claim 19 wherein said user defined priority is a print speed threshold.

24. The apparatus of Claim 13 wherein a print job is rerouted in the event of printer error based upon factors which may include any of the state of any or all, printers, the type of error, user defined options, and interactive options eligible.

ABSTRACT

The apparatuses and methods described herein implement a novel and unique facility that decrease the time taken to perform a print job. This is accomplished by print load balancing, cluster printing and color, black-and-white page splitting.

The print load balancing consists of several aspects. One aspect is to route print jobs to the most available printer based on factors such as color, black-and-white printing, printing page per minute rates, the number of pages in a job, size and number of copies in a job. Another aspect is to split the printing over more than one printer where there are several copies to be made. Yet another aspect is to split the printing over more than one printer for a single copy.

Cluster printing consists of specifying a group of printers from which a print job can be performed.

Color/black-and-white page splitting consists of splitting a printer job, sending non-color pages to black-and-white printers and sending pages with color, to color printers.

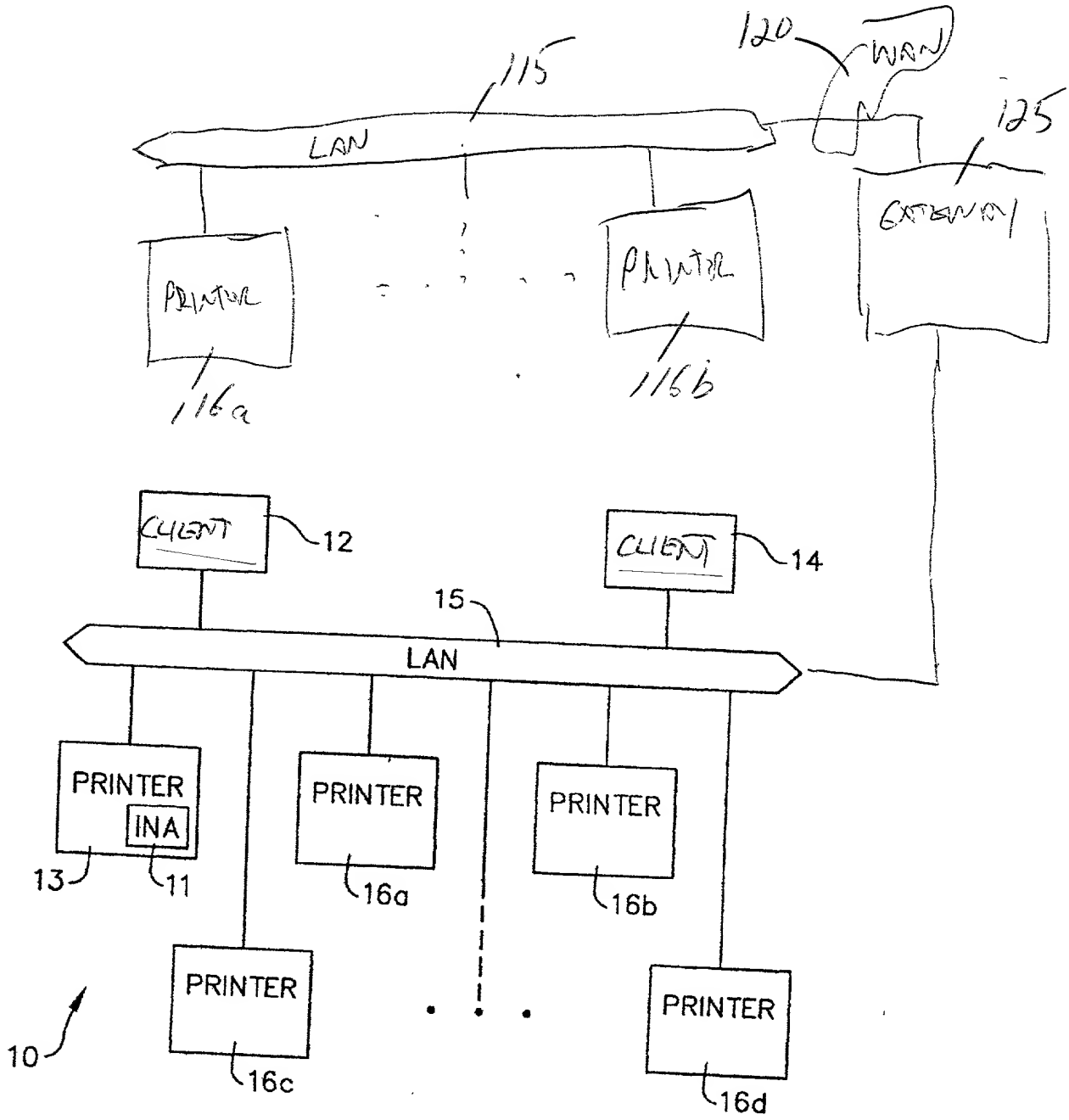
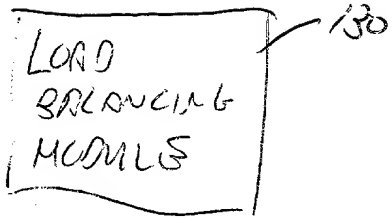

120
WAN
115
LAN
125
PRINTER
PRINTER
116a
116b
CLIENT
12
CLIENT
14
15
LAN
PRINTER
INA
13
11
PRINTER
16a
PRINTER
16b
10
PRINTER
16c
PRINTER
16d

FIG. 1


LOAD
BALANCING
MODULE
130

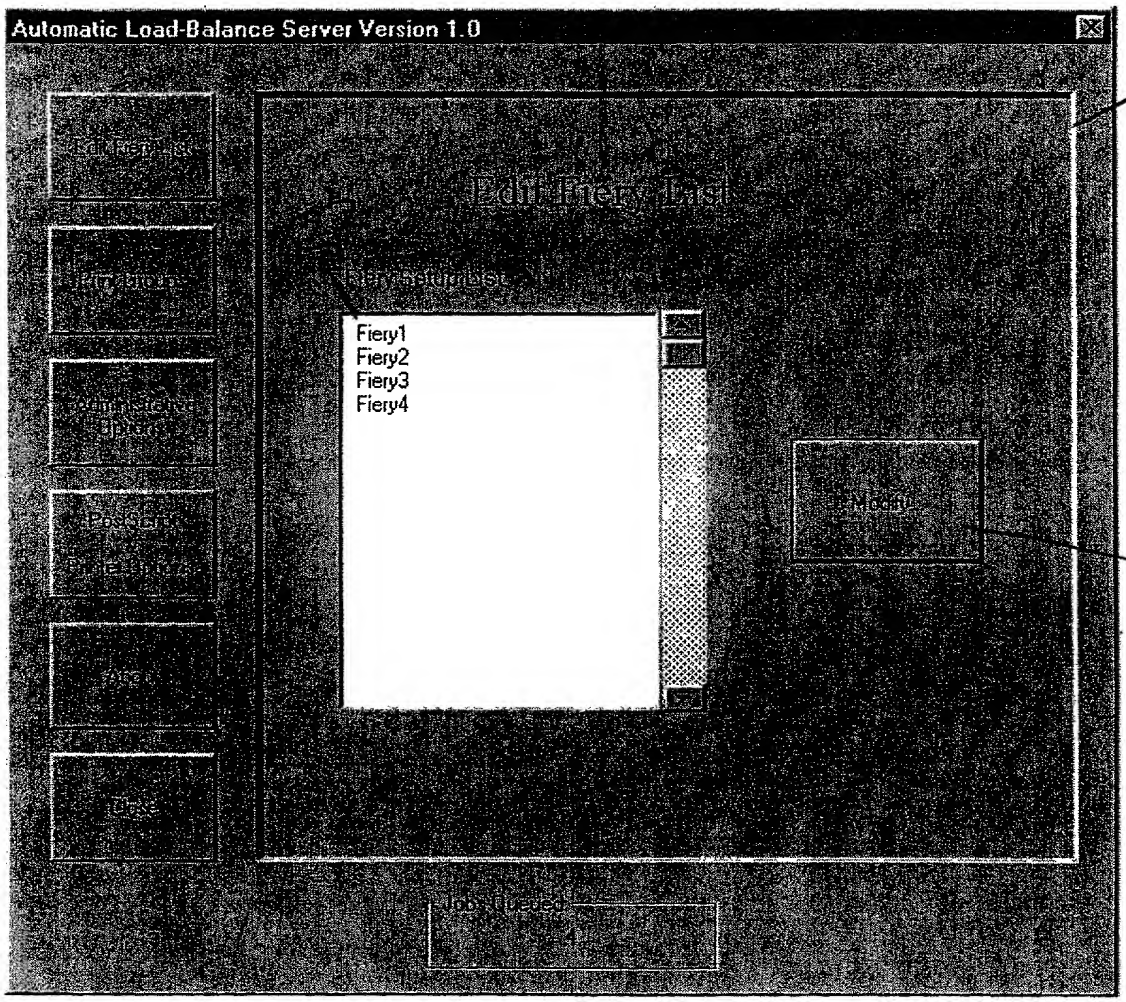

Automatic Load-Balance Server Version 1.0
Edit Fiery List
Fiery1
Fiery2
Fiery3
Fiery4
20
24

FIG. 2

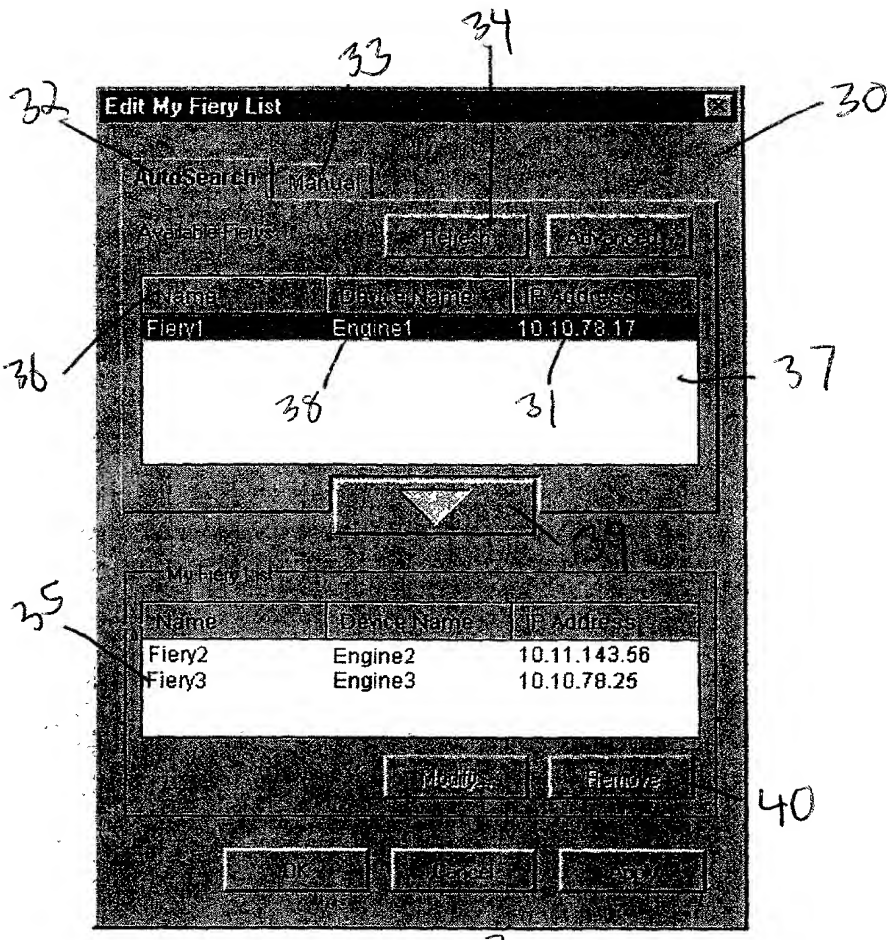

Edit My Fiery List
AutoSearch
Manual
Refresh
Advanced...
Name
Device Name
IP Address
Fiery1
Engine1
10.10.78.17
My Fiery List
Name
Device Name
IP Address
Fiery2
Engine2
10.11.143.56
Fiery3
Engine3
10.10.78.25
Modify...
Remove
OK
Cancel
Help
30
31
32
33
34
35
36
37
38
39
40

FIG. 3

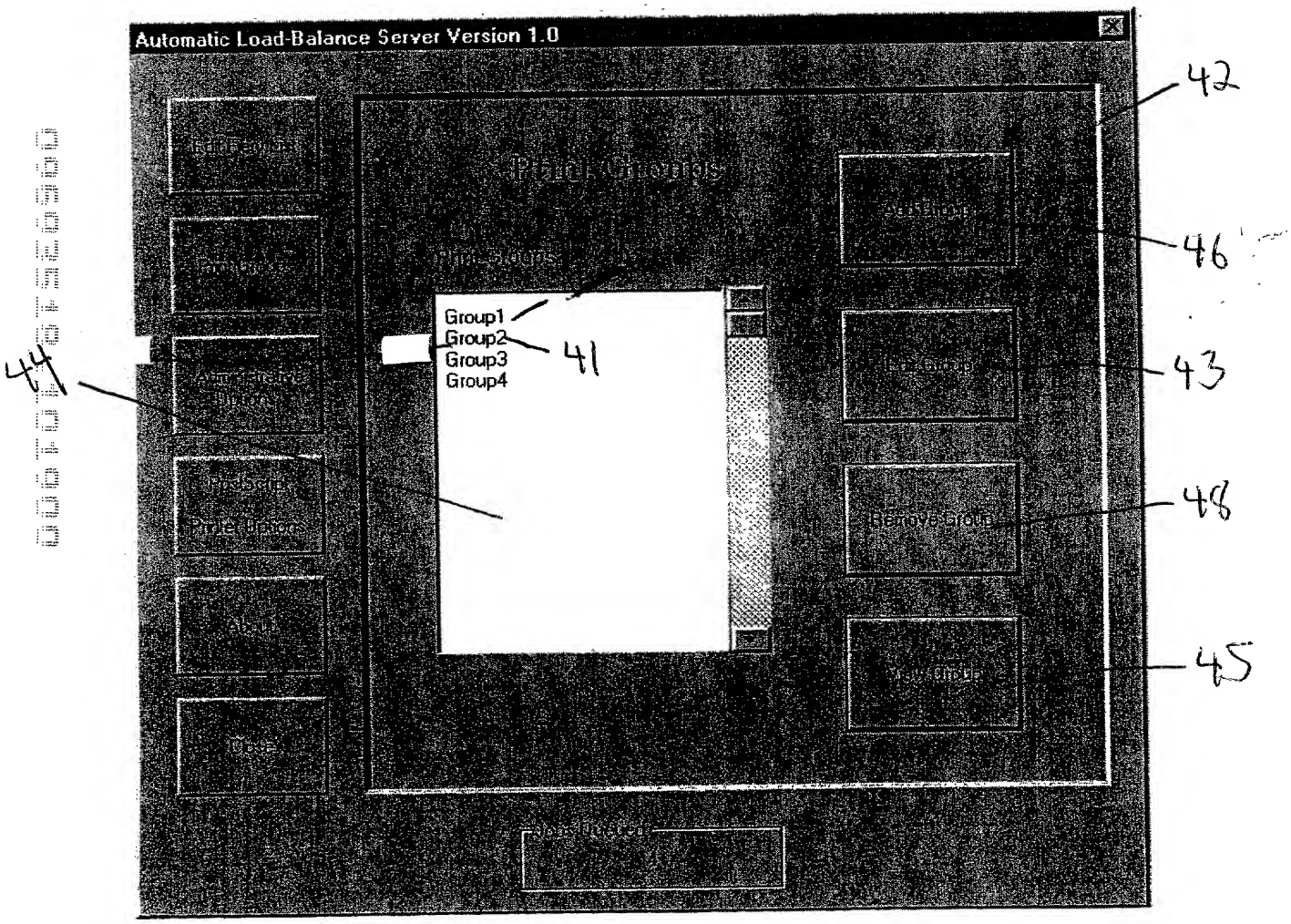

Automatic Load-Balance Server Version 1.0
Print Groups
Group1
Group2
Group3
Group4
Remove Group
42
46
43
48
45
41
44

FIG. 4

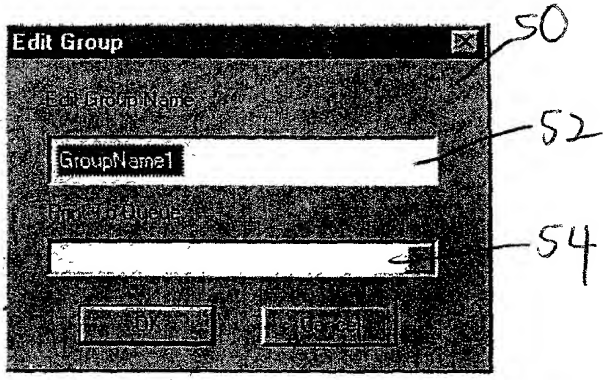


FIG. 5

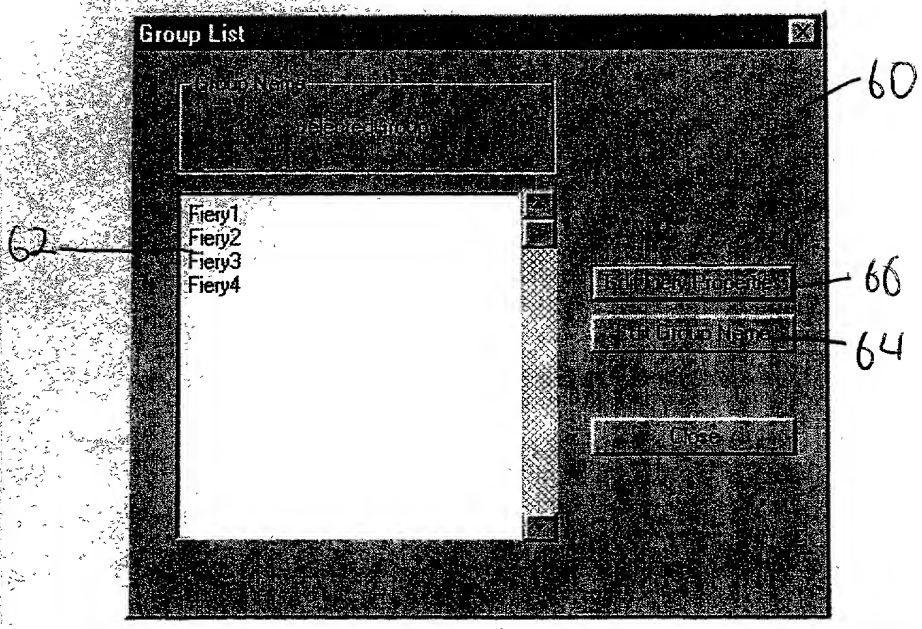


FIG. 6

Attorney Docket No. EFIM0227

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name;

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

AUTOMATIC PRINT LOAD BALANCING

the specification of which (check one) X is attached hereto, or ___ was filed on _____ as Application Serial No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United Sates Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
			Yes	No
Number	Country	Day/Month/Year Filed	___	___
Number	Country	Day/Month/Year Filed	___	___

==========

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

MICHAEL A. GLENN, Reg. No. 30,176
JAMES L. ETHERIDGE, Reg. No. 37,614
DONALD M. HENDRICKS, Reg. No. 40,355
CHRISTOPHER PEIL, Reg. No. 45,005
EARLE JENNINGS, Reg. No. 44,804
JACK J'MAEV, Reg. No. P45,669

Attorney Docket No. EFIM0227

SEND CORRESPONDENCE TO:

MICHAEL A. GLENN, 3475 Edison Way, Suite L, Menlo Park, CA 94025

==========

I hereby claim the benefit under Title 35, United States code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

60/160,414	10/19/99	Provisional-Pending
Application Ser. No.	Filing Date	Status: Patented, Pending, Abandoned

==========

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: MARGARET MOTAMED

Inventor's signature _____ _____
Date

Residence 208 Puffin Court, Foster City, California 94404

Post Office Address Same

Citizenship United States of America

Full name of second joint inventor: RAVI SOMESHWAR

Inventor's signature _____ _____
Date

Residence 26 Barcelona Circle, Redwood City, California 94065

Post Office Address Same

Citizenship India

Attorney Docket No. EFIM0227

Full name of third joint inventor: RAVINDRANATH GUNTURU

Inventor's signature _____ _____

Date

Residence 36857C Newark Blvd. Newark, California 94560

Post Office Address Same

Citizenship India